REMARKS

Applicant has carefully reviewed the Final Office Action mailed August 20, 2008 and offers the following remarks to accompany the above amendments.

Applicant wishes to thank the Examiner for indicating that claims 5, 13, 14, and 44-47 would be allowable if rewritten in independent form. Applicant has rewritten claims 5 and 13 as independent claims. Claims 5 and 13 should now be allowable. Claim 14 is now allowable as being based on an allowable claim.

Claim 16 has been rewritten as an independent claim. Claim 16 previously depended from claim 1; as such, claim 16 is the same as before, just in independent form. Thus, no new matter has been added and no new search is required. Claim 1 has been cancelled. Claims 2, 3, 10, and 15 have been amended to depend from claim 16 to maintain proper dependency.

Claim 32 has been rewritten as an independent claim. Claim 32 previously depended from claim 29; as such, claim 32 is the same as before, just in independent form. Thus, no new matter has been added and no new search is required. Claims 29-31 and 56 have been cancelled.

Claims 29-38 and 52-55 were rejected under 35 U.S.C. § 112, first paragraph, for allegedly disclosing a single means claim (Final Office Action mailed August 20, 2008, p. 3). In particular, the Patent Office asserts that these claims recite only one means, a processor, configured to carry out a function. *Ibid.* Applicant respectfully disagrees for the reasons set forth on page 2 of its Response filed May 15, 2008. However, in an effort to advance the prosecution, Applicant has amended claims 32, 35, 52, and 53 to recite an input means. Claims 29-31 have been cancelled, as discussed above. An input means is a separate element, pursuant to 35 U.S.C. § 112, sixth paragraph. Therefore, as amended, claims 32-38 and 52-55 now recite more than a single means. As such, the Patent Office's rejection of claims 32-38 and 52-55 under 35 U.S.C. § 112, first paragraph is improper and should be withdrawn.

Claims 1-4, 6-9, 13, 15-20, 22, 26-29, 31, 32, 34, 35, 38-43, and 48-56 were rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 6,873,606 B2 to Agrawal et al. (hereinafter "Agrawal"). Applicant respectfully traverses. For a reference to be anticipatory, the reference must disclose each and every claim element. Further, the elements of the reference must be arranged as claimed. M.P.E.P. § 2131. The requirement that each and every element be disclosed in the manner claimed is a rigorous standard that the Patent Office has not met in this case.

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Claim 16 has been rewritten as an independent claim. Claim 16 previously depended from claim 1, so claim 16 is the same as before, just in independent form. Claim 16 recites a method of processing signals to be transmitted to receivers on a plurality of communication channels, comprising:

determining pre-coding signal weights based on channel state information associated with the plurality of communication channels to provide proportional power allocation to the signals;

applying the pre-coding signal weights to the signals;

transmitting weighted signals to the receivers on the plurality of communication channels; and

at each of the receivers:

receiving a subset of the weighted signals over a sub-group of the plurality of communication channels; and

decoding the subset of the weighted signals using inverses of the pre-coding signal weights based on the channel state information associated with the sub-group of the plurality of communication channels.

Claim 16 originally depended from claim 1, and is thus patentable for the reasons previously set forth with respect to original claim 1 (See Response filed May 15, 2008, pp. 5-8). In addition, claim 16 recites that receiving a subset of the weighted signals over a sub-group of the plurality of communication channels and decoding the received subset of the weighted signals using inverses of the pre-coding signal weights based on channel state information associated with the sub-group of the plurality of communication channels is performed at each of the receivers. The Patent Office has made no showing as to the limitations recited in claim 16 as to subsets and sub-groups and decoding the received subset of weighted signals using inverses of the pre-coding signal weights based on the channel state information associated with the sub-group of the plurality of communication channels. Agrawal does not teach "receiving **a subset** of the weighted signals over **a sub-group of the plurality of communication channels**" at each of the receivers, as recited in claim 16. Agrawal also does not disclose "decoding **the subset of the weighted signals** using inverses of the pre-coding signal weights based on the channel state information associated **with the sub-group of the plurality of communication channels**" at each of the receivers, as recited in claim 16. Agrawal does not teach the claimed subset of weighted signals nor the claimed sub-group of the plurality of communication channels.

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With respect to claim 16, the Patent Office cited to column 9, lines 51-62 of Agrawal (Final Office Action mailed August 20, 2008, p. 5). The cited portion of Agrawal does disclose a receiver for processing a received signal from an associated antenna to provide a received symbol stream (Agrawal, col. 9, lines 51-62). However, there is no teaching or suggestion that **a subset** of the weighted signals over **a sub-group of the plurality of communication channels** is received at each receiver. Agrawal is silent as to subsets of weighted signals and sub-groups. Thus, Agrawal does not teach "receiving **a subset** of the weighted signals over **a sub-group of the plurality of communication channels**" at each of the receivers, as recited in claim 16. Since Agrawal does not teach each and every element of claim 16, claim 16 is not anticipated by Agrawal.

Agrawal also does not teach "decoding **the subset of the weighted signals** using inverses of the pre-coding signal weights based on the channel state information associated **with the sub-group of the plurality of communication channels**," as recited in claim 16. The Patent Office has not pointed to any teaching in Agrawal that a subset of the weighted signals is received and decoded using inverses of the pre-coding signal weights based on the channel state information associated with the sub-group of the plurality of communication channels. Applicant finds no teaching in Agrawal of decoding **a subset** of the weighted signals, nor does Applicant find any teaching of using **inverses of the pre-coding signal weights** based on channel state information associated **with the sub-group of the plurality of communication channels**. Thus, Agrawal does not teach "decoding **the subset of the weighted signals** using inverses of the pre-coding signal weights based on the channel state information associated **with the sub-group of the plurality of communication channels**," as recited in claim 16. Claim 16 is thus patentable for this additional reason.

Claims 2-4, 6-12, and 15 depend directly or indirectly from claim 16, and are patentable based on their dependency from claim 16.

Claim 17 is directed to a method comprising:

receiving over a sub-group of a plurality of communication channels a subset of a plurality of signals to which pre-coding signal weights based on channel state information associated with the sub-group of the plurality of communication channels to provide proportional power allocation have been applied; and

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decoding the subset of the plurality of signals using inverses of the pre-coding signal weights based on the channel state information associated with the sub-group of the plurality of communication channels.

Thus, claim 17 has limitations similar to those recited in claim 16. As discussed above with respect to claim 16, Agrawal does not teach "receiving over **a sub-group** of a plurality of communication channels **a subset** of a plurality of signals," as recited in claim 17. Agrawal is silent as to subsets of weighted signals and sub-groups. Thus, claim 17 is also patentable over Agrawal.

In addition, as also discussed above with respect to claim 16, Agrawal does not teach "decoding the **subset** of the plurality of signals using **inverses of the pre-coding signal weights** based on the channel state information associated with **the sub-group** of the plurality of communication channels," as recited in claim 17. The Patent Office has not pointed to any teaching in Agrawal that a subset of the weighted signals is received and decoded using inverses of the pre-coding signal weights based on channel state information associated with the sub-group of the plurality of communication channels. Applicant finds no teaching in Agrawal of decoding **a subset** of the weighted signals, nor does Applicant find any teaching of using **inverses of the pre-coding signal weights** based on channel state information associated **with the sub-group of the plurality of communication channels**. Claim 17 is thus patentable for this additional reason.

Claims 18-28 depend from claim 17 and include all of the limitations of claim 17. Claims 18-28 are thus patentable over Agrawal for at least the same reasons set forth above with respect to claim 17.

Claim 32 recites a system for processing signals to be transmitted to receivers on a plurality of communication channels comprising:

an input means for receiving the signals; and

a processor configured to determine pre-coding signal weights based on channel state information associated with the plurality of communication channels to provide proportional power allocation to the signals, and to apply the pre-coding signal weights to the signals,

wherein the system is implemented at a network element of a communication network, the communication network further comprising a plurality of receivers, each receiver of the plurality of receivers comprising:

an input means for receiving a subset of weighted signals over a sub-group of the plurality of communication channels; and

a processor configured to decode the subset of the weighted signals using inverses of the pre-coding signal weights based on the channel state information associated with the sub-group of the plurality of communication channels.

Independent claims 32 and 35 have similar limitations to those recited in claims 16 and 17 and are thus patentable for at least the same reasons set forth above with respect to claims 16 and 17.

Claims 33 and 34 depend from claim 32 and include all of the limitations of claim 32. Claims 36-38 depend from claim 35 and include all of the limitations of claim 35. Claims 33, 34, and 36-38 are thus patentable over Agrawal for at least the same reasons set forth above with respect to claims 32 and 35.

Claim 39 is an independent method claim that recites a method of processing signals to be concurrently transmitted to receivers over a plurality of communication channels comprising:

determining channel state information for the plurality of communication channels;

determining a spatial coding matrix comprising a respective set of spatial coding weights for each of the receivers based on the channel state information; and

applying the respective set of spatial coding weights in the spatial coding matrix to the signals.

The Patent Office has not cited to any portion of Agrawal that discloses determining a spatial coding matrix comprising **a respective set of spatial coding weights for each of the receivers** based on the channel state information, as recited in claim 39. Agrawal discloses matrices, but the Patent Office has not cited to any particular portion of Agrawal that teaches a spatial coding matrix comprising a respective set of spatial coding weights for each of the receivers. There is no teaching or suggestion that there is a respective set of spatial coding weights **for each of the receivers**. Claim 39 is thus patentable over Agrawal since Agrawal does not teach each and every element of claim 39.

Claims 40-49 depend from claim 39 and include all of the limitations of claim 39. Claims 40-49 are thus patentable over Agrawal for at least the same reasons set forth above with respect to claim 39.

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Claim 50 is an independent claim and contains similar limitations to the limitations in claim 39. In particular, claim 50 recites "receiving from the transmitter one of a plurality of demodulation matrices for demodulating subsequently received communication signals to which spatial coding weights comprising **respective sets of spatial coding weights for a plurality of receivers** have been applied." As discussed above, Agrawal does not disclose respective sets of spatial coding weights for a plurality of receivers. The Patent Office has not indicated anything in Agrawal that is equivalent to the claimed demodulation matrices and respective sets of spatial coding weights. Accordingly, claim 50 is patentable over Agrawal for the same reasons set forth above with respect to claim 39.

Claim 51 depends from claim 50 and includes all of the limitations of claim 50. Claim 51 is thus patentable over Agrawal for at least the same reasons set forth above with respect to claim 50.

Claim 52 is an independent claim and contains similar limitations to the limitations in claims 39 and 50. In particular, claim 52 recites a processor configured to determine channel state information for each of a plurality of communication channels between the network element and the plurality of communication terminals, to determine a spatial coding matrix comprising **a respective set of spatial coding weights for each of the plurality of communication terminals** based on the channel state information, and to apply the respective set of spatial coding weights in the spatial coding matrix to the signals. As discussed above, Agrawal does not teach a spatial coding matrix comprising **a respective set of spatial coding weights for each of the plurality of communication terminals**. Thus, Agrawal does not teach each and every element of claim 52. Claim 52 is therefore not anticipated by Agrawal.

Claims 53-55 depend from claim 52 and include all of the limitations of claim 52. Claims 53-55 are thus patentable over Agrawal for at least the same reasons set forth above with respect to claim 52.

In addition, the Patent Office has not indicated what in Agrawal is equated to the claimed beamformers in claim 54. Accordingly, claim 54 is patentable for this additional reason.

Further, certain dependent claims contain additional limitations that the Patent Office has failed to show are taught by Agrawal. For example, claim 3 depends from claim 1 and further recites "wherein the pre-coding signal weights are elements of a pre-coding matrix P, and wherein determining further comprises determining the pre-coding signal weights to enhance

diagonal elements of a combined communication channel matrix $C = HP$, where H is a matrix of the channel state information." The Patent Office has failed to point out with particularity what in Agrawal is being equated to the claimed combined communication channel matrix $C=HP$. Claims 20 and 27 recite a similar limitation regarding a combined communication channel matrix $C=HP$. Thus, claims 3, 20, and 27 are patentable for this additional reason.

Applicant also respectively submits that the Patent Office has failed to show where each of the limitations of claims 6-9 and 43 are found in Agrawal. The Patent Office merely alleged that Agrawal discloses a diagonal matrix, a transmit basis matrix, that each element is scaled with its associated weight, and off diagonal elements of the matrix will be forced to zero (Office Action mailed August 20, 2008, p. 4). Claims 6-9 and 43 recite additional elements not addressed by the statements made by the Patent Office. Thus, the Patent Office has not made a *prima facie* showing of where each and every element of claims 6-9 and 43 are found in Agrawal. The rejections of claims 6-9 and 43 should therefore be withdrawn.

Claims 10, 11, 23-25, 30, 33, 36, and 37 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Agrawal in view of U.S. Patent Application Publication No. 2005/0053170 A1 to Catreux et al. (hereinafter "Catreux"). Applicant respectfully traverses. To establish *prima facie* obviousness, the Patent Office must show where each and every element of the claim is taught or suggested in the combination of references. M.P.E.P. § 2143.03.

Claims 10 and 11 variously depend from claim 16 and contain all of the limitations of claim 16. Claims 23-25 variously depend from claim 17 and contain all of the limitations of claim 17. Claim 33 depends from claim 32 and contains all of the limitations of claim 32. Claims 36 and 37 variously depend from claim 35 and contain all of the limitations of claim 35. Thus, each of the dependent claims 10, 11, 23-25, 33, 36, and 37 are patentable based on their dependency from the allowable independent claims. In particular, as discussed above, Agrawal does not teach or suggest receiving **a subset** of the weighted signals over **a sub-group of the plurality of communication channels**" and Agrawal also does not disclose decoding **the subset of the weighted signals** using inverses of the pre-coding signal weights based on channel state information associated **with the sub-group of the plurality of communication channels**, as recited in the claimed invention. Catreux does not cure the deficiencies of Agrawal in this regard. Catreux is cited merely for its alleged disclosure of interference cancellation. Thus, the combination of Agrawal and Catreux does not teach or suggest each and every element of claims

10, 11, 23-25, 30, 33, 36, and 37. Claims 10, 11, 23-25, 30, 33, 36, and 37 are therefore patentable.

Claim 21 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Agrawal in view of U.S. Patent No. 5,828,658 to Ottersten et al. (hereinafter "Ottersten"). Applicant respectfully traverses. The standards for obviousness are set forth above.

Claim 21 depends indirectly from claim 17 and includes all of the limitations of claim 17. Thus, claim 21 is patentable based on its dependency from the allowable independent claim. In particular, as discussed above, Agrawal does not teach or suggest "receiving **a subset** of the weighted signals over **a sub-group of the plurality of communication channels**" and Agrawal also does not disclose decoding **the subset of the weighted signals** using inverses of the pre-coding signal weights based on channel state information associated **with the sub-group of the plurality of communication channels**, as recited in the claimed invention. Ottersten does not cure the deficiencies of Agrawal in this regard. Ottersten is cited merely for its disclosure of the Moore-Penrose pseudo-inverse matrix. Thus, the combination of Agrawal and Ottersten does not teach or suggest each and every element of claim 21. Claim 21 is therefore patentable over the cited references.

The present application is now in condition for allowance and such action is respectfully requested. The Examiner is encouraged to contact Applicant's representative regarding any remaining issues in an effort to expedite allowance and issuance of the present application.

Respectfully submitted,
WITHROW & TERRANOVA, P.L.L.C.

Anthony Josephson
Reg. No. 45,740

By: _____

for : John R. Witcher, III
Registration No. 39,877
100 Regency Forest Drive, Suite 160
Cary, NC 27518
Telephone: (919) 238-2300

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